# 9 JACS South East Asia
# Improving Living Conditions through Integrated Environmental Management

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Fig. 1
Open canal heavily polluted by liquid and solid wastes in the city of Kunming, Yunnan Province. Poor environmental sanitation has become one of the main problems in the fast-growing urban areas of the Greater Mekong Subregion. Photo: R. Schertenleib, March 2002

* On behalf of all the participants of the workshop in Hanoi, Vietnam, of 21–23 August 2001 (listed in Annex 1, p. 452)

## Abstract

The case studies in the JACS South East Asia address key issues in the six countries of the Greater Mekong Subregion (GMS), which has a total population of 240 million people. Together, the lands of the GMS cover some 2.3 million $km^2$. The GMS is a vast area that possesses an enormous wealth and variety of natural resources. This rich resource endowment has made the region a new frontier of Asian economic growth. Indeed, the Mekong region has the potential to be one of the world's fastest-growing areas. While traditional lifestyles and deep-rooted customs and beliefs have been scarcely altered by the passage of time, the area is now undergoing greater change than ever before. During a workshop held in Hanoi in August 2001, lack of access to adequate environmental sanitation services was identified as one of the key problems in the urban and peri-urban context; this problem needs to be addressed by the NCCR North-South in future research activities. In both the highland and the highland-lowland contexts, overexploitation of natural resources – mainly in the form of deforestation – was identified as one of the main issues. Research activities in this syndrome context will focus on the development of mitigating strategies in the case of conflicts between slash-and-burn farmers in the hills and rice farmers in the valleys. This research will also examine the spatial distribution of forms and levels of poverty in the uplands, systems of land conservation and the political decision-making process related to conservation of forests.

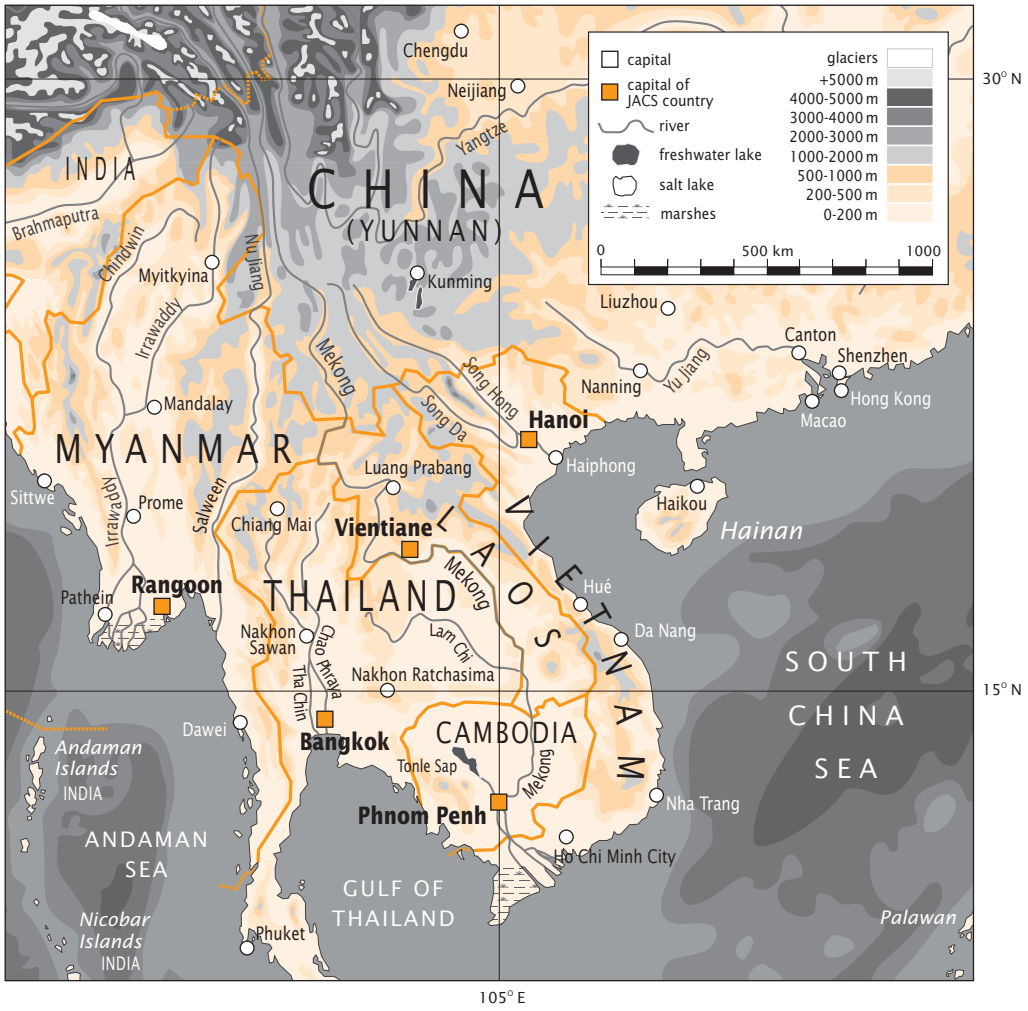


*Fig. 2: JACS South East Asia – The Greater Mekong Subregion. The case studies in the JACS South East Asia address key issues in the six countries of the Greater Mekong Subregion: Cambodia, China (Yunnan Province), Laos, Myanmar, Thailand and Vietnam. The case studies look at urban and highland-lowland contexts from social, political, economic and ecological perspectives.*

## 9.1 Introduction to the JACS South East Asia region

The Greater Mekong Subregion (GMS), with a population of 240 million people, covers six nations: Cambodia, China (Yunnan Province), Laos, Myanmar, Thailand and Vietnam. The Mekong River either forms a boundary of these countries or flows through their territory.

Together, the lands of the GMS cover some 2.3 million $km^2$. The GMS is a vast area possessing an enormous wealth and variety of natural resources, including a rich agricultural base, timber, fisheries, minerals and energy in the form of hydropower and coal and petroleum reserves. These resources fuel economic development and support rural livelihoods in an interrelated fashion. Water from the Mekong River supports agriculture, and its fish yields are a source of both protein and income. The river is also used to generate electricity and serves as a transport corridor. Forests in the Mekong region protect hydropower projects and agriculture from siltation and soil erosion, contribute to tourism potential, and provide subsistence to rural communities in the form of food, medicinal plants, fuelwood and other non-timber products.

The great majority of the people in this region live in rural areas where their lifestyles are based on subsistence or semi-subsistence agriculture. More than 75% of the population of the Lao PDR, for example, is rural. Even Thailand, the most urbanised of the Mekong countries, has large agricultural communities, particularly in the north and north-eastern parts of the country.

While traditional lifestyles and deep-rooted customs and beliefs have been scarcely altered by the passage of time, the area is now undergoing greater change than ever before. With the onset of peace in the 1990s, the peoples of the Mekong region have begun to experience rapid changes and improvements in their standard of living. Increasingly, modernisation and industrialisation are emerging from a process of transition and transformation. The Mekong countries are gradually shifting from subsistence farming to more diversified economies and to more open, market-based systems. Concurrently, commercial relations among the six Mekong countries are increasing, notably in terms of cross-border trade, investment and labour mobility. Moreover, natural resources, particularly hydropower, are beginning to be developed and utilised on a subregional basis.

The key performance indicators for Mekong countries are given in Table 1. The gross domestic product (GDP) per capita is about USD1 per day in most of the region. Despite significant economic growth, poverty is still widespread. The region is also characterised by disparities between urban and rural communities, a growing gap between rich and poor, inadequate attention to the special needs of ethnic minorities, gender inequities, lack of access to basic health and education, and inadequate protection of the environment on which traditional livelihoods depend.

Fig. 3
Family fish farm near the Tha-chin River in Thailand. Small and medium-size fish and shrimp farming, which depend on good surface water quality, are the basis of traditional livelihoods in many parts of the Greater Mekong Subregion. Photo: R. Schertenleib, March 2003

Table 1

Some key indicators for the countries in the JACS South East Asia.

| | Year | Cambodia | China | Lao PDR | Myanmar | Thailand | Vietnam |
|---|---|---|---|---|---|---|---|
| **Geography and social indicators** | | | | | | | |
| Surface (thousand sq. km) | 2000 | 181 | 9598 | 237 | 677 | 513 | 332 |
| Total population (million) | 2000 | 13.1 | 1275.1 | 5.3 | 47.7 | 62.8 | 78.1 |
| Annual population growth rate (%) | 1990–2000 | 2.7 | 1.1 | 2.6 | 1.2 | 0.9 | 1.7 |
| Urban population (% of total population) | 2000 | – | 32 | 24 | – | 22 | 24 |
| Annual urban growth rate (%) | 1990–1995 | 6.5 | 3.8 | 6.5 | 3.3 | 2.3 | 3.1 |
| **Development and economic indicators** | | | | | | | |
| GDP per capita, at purchasing power parties (USD) | 2000 | 1446 | 3976 | 1575 | – | 6402 | 1996 |
| HDI rank (total 173) | 2002 | 130 | 96 | 143 | 127 | 70 | 109 |
| Human Poverty Index (% of population below poverty line) | 1989–2000 | 36.1 | 4.6 | 46.1 | – | 13.1 | 50.9 |
| Population in agriculture male / female (% of labour force) | 1980–1982*<br>1998–2000 | – | – | 77/ 82* | – | 50/ 47 | – |
| Public expenditure on education / health (% of total public expenditure) | 1995–1997/ 1998 | 2.9/ 0.6 | 2.3/ 2.1 | 2.1/ 1.2 | 1.2/ 0.2 | 4.8/ 1.9 | 3.0/ 0.8 |
| Population with access to safe water / adequate sanitation (%) | 2000 | 30/ 18 | 75/ 38 | 90/ 46 | 68/ 46 | 80/ 96 | 56/ 73 |
| **Environmental indicators** | | | | | | | |
| Crop land per capita (hectares) | 1997–1999 | 0.32 | 0.1 | 0.17 | 0.21 | 0.25 | 0.04 |
| Area of severe soil degradation (% of country) | 2000 | 49 | 35 | 1 | 36 | 78 | 88 |
| Protected area (% of total surface) | 1999 | 16.2 | 6.4 | 0 | 0.3 | 13.9 | 3.1 |
| Energy consumption per capita (kilogram of oil equivalent) | 1999 | – | 868 | – | 273 | 1169 | 454 |

Sources:
UNDP, 2002;
World Bank, 2002a+b;
FAO, 2000

## 9.2 Identification of core problems according to syndrome context

### 9.2.1 Current problems

As previously mentioned, the Greater Mekong Subregion is rich in natural resources and human culture. This rich resource endowment has made the region a new frontier of Asian economic growth. Indeed, the GMS has the potential to be one of the world's fastest-growing areas. But population growth and economic growth in particular are putting its unrivalled natural environment at great risk. The economic logic that made geographical boundaries useful lines of demarcation has effectively disappeared. The people of the GMS have collectively become heavily dependent on the region's shared natural resource base for their livelihood.

The countries in the GMS are striving to alleviate poverty, minimise disparities in resource distribution, manage natural resources and protect the natural environment. In addition, foreign donors, governments, and international organisations are attaching environmental requirements to projects, in accordance with the principles of sustainable development. Nevertheless, all national institutions involved in trying to minimise environmental problems and build a well-managed society have been hampered by numerous setbacks. The most critical of these include the following:

1. Policy and regulatory frameworks that are inadequate for integrating environmental-economic planning.
2. Centralised decision-making and command over public services, infrastructure and the natural environment.
3. Inadequate databases and funding to support sound decision-making.
4. Ineffective design, enforcement and monitoring of policy implementation.

In the absence of sound management, economic growth and infrastructure development in the region can be expected to put further stress on natural resources, water quality and quantity and ecosystem integrity.

The core problems differ from nation to nation and region to region, depending on various factors. Selection of problems and projects to be developed depends on the area envisaged and on local, national and regional interests. During a workshop held in Hanoi, Vietnam, from 21 to 23 August 2001, a group of 28 experts from Cambodia, Laos, Thailand, Vietnam and Switzer-

land, working in different fields, identified a list of core problems in the urban and peri-urban syndrome context as well as in highland-lowland areas, and rated them according to their importance and urgency.

### 9.2.2 Identification of core problems in the urban and peri-urban context

As in most parts of the developing world, the countries of the Greater Mekong Subregion are facing serious and growing problems related to rapid population increase in urban agglomerations. The full list of core problems identified by the participants in the Hanoi workshop for the urban and peri-urban context is given in Table 2. These core problems were assigned to the 5 major scientific realms, which include political and institutional issues, socio-cultural and economic issues, population and livelihood issues, infrastructure and land use issues, and bio-physical and ecological issues.

Table 2

Urban and peri-urban context – core problems and their weighting by realm.

| No. | Problem | Weighting |
|---|---|---|
| **1.** | **Political and institutional realm** | |
| 1. | Poor governance | 6 |
| 2. | Weak leadership | 6 |
| 3. | Lack of coordination between stakeholders; lack of coordination between sectors | 6 |
| 4. | Inadequate municipal management capacity; mismatch between institutions and the socio-economic and environmental realities they are trying to manage | 6 |
| 5. | Insufficient coordination of river water resource management (see No. 61) | 6 |
| 6. | Inadequate legal framework for municipal management (over-centralisation) | 5 |
| 7. | Poor regulations; lack of enforcement of existing regulations leads to degeneration of facilities and conditions | 5 |
| 8. | Inappropriate environmental sanitation strategies with over-centralised systems and poor allocation of responsibilities | 5 |
| 9. | Ineffective urban planning | 5 |
| 10. | Inappropriate and discriminatory policies on urban migration (e.g. residential registration – see No. 34) | 5 |
| 11. | Insufficient participation of the population in policy and planning decisions | 5 |
| 12. | Lack of linkage between urban and rural development policies | 5 |
| 13. | Inadequate strategy and planning at the national and international levels | 4 |
| 14. | Poor cost recovery from service systems; high "administrative" water losses due to non-payment for consumed water | 4 |
| 15. | Lack of groundwater protection in urban areas; no control of well construction | 4 |
| 16. | Solid waste management: over-centralised, inadequate composting and recycling | 3 |

Table 2

(continued)

| No. | Problem | Weighting |
|---|---|---|
| **2.** | **Socio-cultural and economic realm** | |
| 17. | Commercially driven development is undermining traditional values and respect for education (in Laos) | 6 |
| 18. | Growing "floating" population of seasonal and daily migrants (see No. 34) | 6 |
| 19. | Urban migration; uncontrolled growth in urban periphery | 6 |
| 20. | Young people search for work instead of continuing their education | 5 |
| 21. | Shortage of technicians – great gap between engineers and unskilled workers | 5 |
| 22. | Social problems and urban violence (crime, prostitution, drug abuse, etc.) | 5 |
| 23. | Unemployment and, more frequently, under-employment | 5 |
| 24. | Inadequate access to social services and infrastructure (affordability, etc.) | 5 |
| 25. | Poor cost recovery from service systems (see No. 14) | 4 |
| 26. | Inappropriate understanding among the population of water as a scarce resource | 4 |
| 27. | Trained people are drawn to large cities, aggravating the shortage of human resources in small towns and villages | 4 |
| 28. | Increasing socio-economic disparity between urban and rural populations | 4 |
| 29. | Development gap between urban and peri-urban areas and between different cities | 4 |
| 30. | Changing social values – family, tradition, culture – and possible loss of identity | 4 |
| 31. | Lack of social responsibility on the part of government and citizens | 4 |
| 32. | Growing social and spatial segregation in urban areas | 3 |
| **3.** | **Population and livelihood realm** | |
| 33. | Migration and associated problems for populations concerned, caused in part by inappropriate attempts to control migration (see No. 9) | 6 |
| 34. | Growing "floating" population of seasonal and daily migrants (see No. 18) | 6 |
| 35. | Urban migration and uncontrolled growth at urban periphery (see No. 19) | 5 |
| 36. | Inadequate and poor quality housing; growth of slums | 5 |
| 37. | Poverty | 5 |
| 38. | Poor access to public health facilities | 4 |
| 39. | Inadequate food security and safety | 4 |
| 40. | Insecure land tenure | 4 |
| 41. | Relocation and resettlement causes hardship and interrupts the livelihood of populations affected | 4 |
| 42. | Lack of gender balance; lower status of women | 4 |
| 43. | Public health problems | 3 |
| 44. | Aesthetic problems related to environmental degradation and poor living conditions | 3 |
| 45. | Lack of awareness of public health risks and environmental sanitation (see No. 65) | 3 |
| **4.** | **Infrastructure and land use realm** (part 1) | |
| 46. | Poor environmental sanitation | 7 |
| 47. | Flooding and associated economic and social problems | 6 |
| 48. | Mounting transportation problems; congestion; inadequate road network, rising volume of private vehicles; lack of public transportation facilities | 6 |
| 49. | Lack of safe drinking water supply | 6 |

(continued p. 272)

Table 2
(continued)

| No. | Problem | Weighting |
|---|---|---|
| **4.** | **Infrastructure and land use realm** (part 2) | |
| 50. | Inappropriate sanitation technology | 5 |
| 51. | Inefficient and conflicting land uses due to ineffective urban planning | 5 |
| 52. | Poor management of local sanitation systems, particularly septic tanks | 5 |
| 53. | Inadequate waste and wastewater management in rapidly growing cities | 4 |
| 54. | Poorly developed environmental sanitation systems; inappropriate, unaffordable solutions; waste of resources | 4 |
| 55. | Problems in selecting suitable technology for wastewater treatment | 4 |
| 56. | High level of physical water losses in the distribution system | 4 |
| 57. | Lack of groundwater protection in urban areas; no control of well construction | 4 |
| 58. | Salt water infiltration in coastal cities | 4 |
| 59. | Loss of historical urban areas; lack of financial resources for their conservation and restoration | 4 |
| 60. | Solid waste management: over-centralised, inadequate composting and recycling | 3 |
| **5.** | **Bio-physical and ecological realm** | |
| 61. | Poor river water quality due to inadequate resource management (see No. 5) | 6 |
| 62. | Poor quality of ground and surface water | 6 |
| 63. | Pollution of surface and groundwater by residential and industrial use | 6 |
| 64. | Inappropriate disposal of the growing volume of waste and hazardous waste | 6 |
| 65. | Lack of environmental awareness (see No. 45) | 6 |
| 66. | Air pollution | 5 |
| 67. | Land encroachment | 5 |
| 68. | Import of environmentally inappropriate technology | 5 |
| 69. | Degradation of natural resources in rural areas, contributing to increasing urban problems | 4 |
| 70. | Trans-border pollution between Mekong countries | 4 |
| 71. | Import of waste from developed countries | 4 |
| 72. | Urban growth in ecologically sensitive areas (e.g. wetlands) | 3 |

The outcome of the weighting of certain core problems gave rise to considerable discussion. Indeed, the assigned weightings do not always appear logical. For example, "poverty" (No. 37) received a lower weighting than "migration" (Nos 18, 19, 33, 34, 35), although it appears to be a more fundamental problem. To take another example, "public health" (No. 43) was considered a less significant problem than "access to health facilities" (No. 38).

There are several possible reasons for this. First, it is clear that a great number of problems had to be assessed very rapidly, and during the workshop there was not enough time to "re-calibrate" the scoring used at different points in the process. Furthermore, the group dynamics of scoring differed considerably between the two working groups; one group obviously gave a higher percentage of lower scores than the other group. There was some ten-

dency to give general problems a greater weighting than specific problems. Thus "environmental sanitation" (No. 46) was given the highest possible weighting, while various components of environmental sanitation – water supply, wastewater treatment and waste collection – received lower scores. Another possible explanation for the apparent anomalies is that participants assessed problems from different perspectives. While some asked: a) How serious is the issue or problem in itself?, others were likely to ask: b) How seriously does the problem affect the particular context?, or: c) How important and relevant is the problem to our work? Of course, the intended perspective would be close to "b". It appears, however, that perspectives "a" and "c" also played a role. To take the example of poverty, some believed it to be the most important problem ("a"), while others – mainly the Vietnamese – saw poverty as a more relative phenomenon and felt that it was not a very serious problem in the local context ("b").

Another issue that gave rise to considerable controversy was migration. Although migration was widely held to be a serious problem, some participants felt that migration as such was not really the problem. Indeed, migration may even be a solution to problems caused by structural change in the economy. Problems relating to urban migration seemed to be perceived in three different ways: 1) inadequate response to the needs of migrants, such as the failure to provide land, housing and services (No. 36); 2) inadequate controls and regulations, leading to uncontrolled urban growth at the periphery (No. 35); and 3) inappropriate and discriminatory controls and regulations (e.g. residential registration), which makes it more difficult for migrants to integrate into the local economy and obtain needed services (No. 10). Finally, as participants pointed out in the plenum discussion, urban migration is basically a problem of urban-rural linkages. It has both positive and negative consequences for rural as well as urban areas. This aspect has not yet been given adequate attention in terms of problem formulation.

### 9.2.3 Identification of core problems in the highland and highland-lowland contexts

Participants in the Hanoi workshop also identified and weighted core problems in the syndrome context of highland areas and relationships between highland and lowland areas. The core problems identified are listed in Table 3.

While most of the heavily weighted problems arise in highland areas, the most serious aspect in about one-quarter (6) of the cases is the relationship between

highland and lowland areas, rather than conditions in the highlands themselves. These key "relationship" problems concern: government policies (No. 5); poverty (No. 13); gender inequality (No. 15); substance abuse (No. 17); water resource allocation (No. 22); and water quality (No. 25). The highland group paid considerable attention to problems related to the transformation from a centrally controlled political economy to a market system. This affects Vietnam and Laos in particular. In Thailand, the problems of globalisation are more acute – particularly those related to the internationalisation of capital.

Table 3

Highland and highland-lowland context: core problems and their weighting.

| No. | Problem | Highland | | Highland – lowland | |
|---|---|---|---|---|---|
| | | Aver. | Spec. | Aver. | Spec. |
| **1.** | **Political and institutional realm** | | | | |
| 1. | Decentralisation of responsibilities and duties without decentralisation of authority and access to resources | 6 | 4 Vietnam | 4 | |
| 2. | Difficulties arising from transition from central planning to a market-oriented economy, and from globalisation and the internationalisation of capital | 6 | 5 Thailand | 6 | 2 Thailand |
| 3. | Existing laws, regulations and policies not consistently enforced | 6 | | 5 | |
| 4. | Lack of people's participation in decision-making | 6 | | 5 | |
| 5. | Uncoordinated and inappropriate government policies and development activities | 5 | | 6 | |
| 6. | Unclear citizenship status (lack of citizenship) among indigenous people in border regions | 2 | 6 Thailand | 1 | 5 Thailand |
| **2.** | **Socio-cultural and economic realm** | | | | |
| 7. | Social and ethnic conflicts over resource use (land, forests, water, minerals) | 6 | 4 Laos | 5 | 4 Laos<br>6 Thailand |
| 8. | Indigenous institutions, rights, regulations and knowledge are unrecognised or lost | 6 | 7 Cambodia | 4 | |
| 9. | Poor and unequal access to training, extension services, credit, etc. | 6 | 4 Thailand | 4 | 6 Vietnam |
| 10. | Lack of access to adequate basic services (health, education, etc.) | 5 | 6 Laos | 4 | 6 Vietnam |
| 11. | Lack of access to markets; limited integration into market systems | 5 | 3 Thailand | 4 | 2 Thailand |
| 12. | Incompatibilities of knowledge systems and attitudes among (lowland) decision-makers and (highland) populations – reinforcing an inferiority complex among highland peoples | 4 | | 4 | |
| **3.** | **Population and livelihood realm** | | | | |
| 13. | High levels of poverty and livelihood insecurity, particularly among people engaged in subsistence production | 5 | 6 Laos, Cambodia | 6 | |

Table 3
(continued)

| No. | Problem | Highland | | Highland – lowland | |
|---|---|---|---|---|---|
| | | Aver. | Spec. | Aver. | Spec. |
| 14. | Insecure land tenure systems | 5 | 6 Thailand | 4 | 3 Laos 5 Thailand |
| 15. | High level of gender inequality | 5 | | 4 | 6 Vietnam |
| 16. | Health problems, vulnerability and risks | 5 | | 4 | |
| 17. | High incidence of sexual and drug abuse; human trafficking | 4 | 6 Thailand 2 Cambodia | 4 | 6 Thailand |
| 18. | High rates of internal and international migration (rural-rural, rural-urban, urban-rural and urban-urban) | 5 | 4 Thailand | 4 | |
| 19. | High population growth | 4 | 3 Thailand | | |
| **4.** | **Infrastructure and land use realm** | | | | |
| 20. | Inappropriate infrastructure solutions, inadequate maintenance and poor access to infrastructure services (esp. transportation, energy, irrigation) | 6 | 4 Thailand | 5 | 2 Thailand |
| 21. | Overuse and misuse of land and forest resources – often driven by lowland interests – resulting in degradation and loss of wildlife | 5 | | 4 | |
| 22. | Ineffective and inequitable use and allocation of water resources (including irrigation) driven by lowland interests | 3 | | 5 | 4 Laos 6 Vietnam |
| **5.** | **Bio-physical and ecological realm** | | | | |
| 23. | Rapid degradation of land and destruction of forests (caused partly by fire) | 5 | 4 Thailand | 4 | 5 Thailand |
| 24. | Loss of biodiversity | 5 | | 5 | |
| 25. | Water resources subject to excessive fluctuation (i.e. flood, drought) and deteriorating quality (i.e. pollution and sedimentation) | 4 | | 5 | |

A number of critical problems in highland areas relate to the clash between the subsistence economy and the lowland-dominated (capitalist) market economy, whose interests (timber, water, etc.) often extend into highland areas. In addition to economic problems, highland-lowland interactions give rise to socio-cultural problems (threats to indigenous "identity") and problems related to social services (loss of traditional forms; inappropriateness of state service systems, etc.). Access to services is limited not only by their shortage but also by the fact that their form (and even the language used) is often poorly adapted to local needs.

At the bio-physical level, the problem of forest fires drew particular attention.

## 9.3 Status and dynamics of core problems

The core problems given the highest weightings during the Hanoi workshop (Tables 2 and 3) are discussed in greater detail in the following sections.

### 9.3.1 Status and dynamics of problems related to the non-sustainable use of freshwater resources

Rapid population and economic growth have had great impacts on the region's freshwater resources, affecting urban and peri-urban as well as highland areas, and the relationship between highland and lowland areas.

As in many other parts of the world (Zehnder et al., 2003), the development and management of water resources in the Greater Mekong Subregion affects the full spectrum of freshwater ecosystem services. Dams and reservoirs, coupled with extensive deforestation in some watersheds, have reduced stream water levels, lowered water tables, degraded riparian wetlands, diminished freshwater aquatic diversity and increased the severity of floods. Water quality has steadily declined, degraded by sewage, industrial effluent, urban and agricultural runoff and saline intrusion. Nutrient loading from agricultural runoff and sewage has worsened water quality to the extent

Fig. 4
Side canal of the Tha-chin River in Thailand. Water quality has been heavily degraded by agricultural runoff (i.e. from pig, duck and chicken farms) and by untreated human excreta. Photo: R. Schertenleib, March 2003

that eutrophication of surface water is now a serious problem in many rivers and canals.

The region's rapidly developing economy requires an increased volume of water to support demands related to agriculture, industry, energy production, and rural and urban households and services. Water use is also affected by other sectors. For example, in Vietnam upland forestry practices (clearing, road building) are leading to increased erosion and sedimentation. This also increases downstream flood risks by diminishing the water retention ability of soils, which in turn alters the hydrological cycle. The range of environmental problems associated with non-sustainable use of water resources is depicted in Fig. 5.

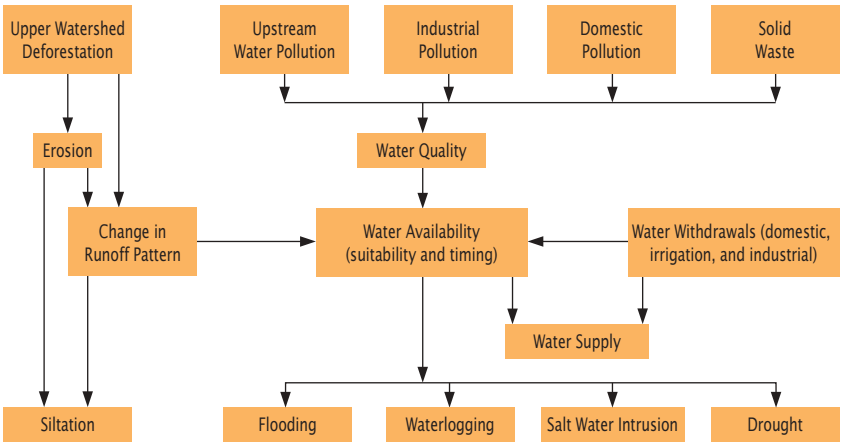


Fig. 5 Problems associated with freshwater withdrawals.

### 9.3.2 Status and dynamics of core problems in the urban and peri-urban context

*The problems of urbanisation*

In the Mekong countries, as in most other parts of the developing world, the last few decades have been characterised by important changes and irreversible trends involving natural, technological, social, economic and political factors. One of the most striking differences observed within the last 25 years is the fast increase of people and economic activity in urban and indus-

trial centres (Fig. 6; UNDP, 2001). This ongoing transition from rural life to city life represents a large-scale, permanent demographic shift with major impacts on extraction and depletion of natural resources, the environment and livelihoods.

Cities require vast quantities of resources – both for their inhabitants and for the economic activities clustered there (World Resources Institute et al., 1996). Urbanisation, industrialisation and economic development are therefore exerting great pressure and demand on land and natural resources, most notably on freshwater resources. Fortunately, the amount of renewable water resources (annual precipitation) in the GMS is relatively high, so that the region is not facing acute water shortage problems. Fig. 8 compares freshwater withdrawals in the Mekong countries with internal renewable water resources (UNDP, 1999).

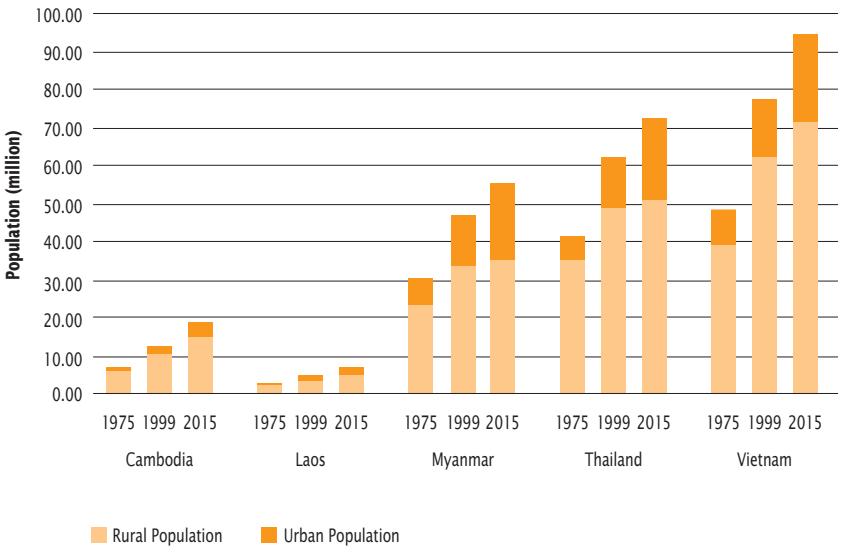


Fig. 6
Development of urbanisation in the Greater Mekong Subregion.

Fig. 7
Dianchi Lake in Yunnan Province, China. Urbanisation, industrialisation, and economic development are exerting great pressure on surface waters and freshwater resources. Photo: R. Schertenleib, March 2002

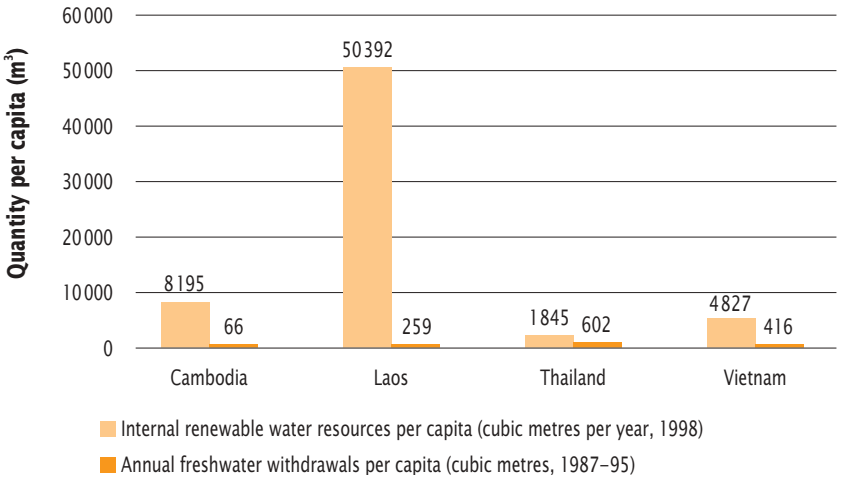


Fig. 8
Freshwater withdrawals compared to renewable water resources.

Many cities are already facing critical environmental degradation. This is mainly the result of improper waste disposal, which leads to contamination of rivers, streams and groundwater, the extraction of water from diminishing aquifers, and a long list of service management deficiencies. Indeed, the lack of adequate environmental sanitation is the most severe environmental problem in many parts of the region. The status and dynamics of this particular problem will be discussed in detail in later paragraphs.

Many of the newcomers in urban areas end up in settlements where municipal investments in services – roads, water supplies and environmental sanitation – are negligible or non-existent. A proliferation of slums, heavy traffic congestion, unprecedented degradation of air quality, uncontrolled industrial growth, threats to public health from water pollution, poor drainage and solid waste disposal practices are becoming more and more serious in the urban agglomerations of the Mekong countries. The impacts of pollution, wastefulness and mismanagement fall most heavily on the urban poor. However inadequate the main services may be, the middle- and upper-income segments of the population with household connections typically receive heavily subsidised services adequate for healthy living. But in the slums and shantytowns there are frequently no services at all (Black, 1996).

*Lack of access to safe drinking water and adequate sanitation services*
According to the latest statistics, a significant proportion of the urban population in the countries of the GMS has no access to safe drinking water (WHO

et al., 2000). For instance, in Vietnam alone, almost 3 million urban dwellers have no access to safe drinking water. The lack of an adequate water supply not only impairs health but also slows economic development. From the point of view of public health, the situation is even more serious with regard to sanitation. It is noteworthy that the situation with respect to water supply and sanitation actually worsened over the last 10 years, despite the fact that the sector has received considerably more attention in recent years. Especially in urban areas, the absolute number of inhabitants without access to safe drinking water and adequate sanitation was higher in 2000 than in 1990.

With regard to water supply in urban areas, many water utilities have been fighting a desperate battle to provide functional service in the face of increasing demand. As the quantity of available drinking water decreases (due to increasing competition among different water uses) and the quality declines, disruptions of existing systems become more acute. A vicious cycle develops in which service is so poor that costs cannot be recovered from users and the income generated is so low that the service cannot be improved.

As in many parts of the developing world, poor environmental sanitation is the most severe environmental problem in the GMS, affecting the living conditions of millions of people. Poor sanitation poses various health hazards, including direct exposure to faeces near homes, contaminated drinking water, ingestion of fish from polluted waters and ingestion of uncooked vegetables irrigated by untreated wastewater. Inadequate access to water and sanitation facilities is actually the main cause of intestinal diseases transmitted by faeces, which are prevalent in the countries of the Greater Mekong Subregion.

In light of the growing numbers of urban inhabitants who do not have access to adequate water, sanitation, drainage and solid waste disposal services, it is clear that a large proportion of humanity has failed to gain access to conventional urban environmental sanitation. Poor planning lies at the heart of current shortcomings in interventions dealing with environmental sanitation (EAWAG/SANDEC and WSSCC, 1999). Too often, environmental sanitation professionals give only lip service to environmental management issues, and services are not conceived in an integrated way that takes into account all their potential impacts. For example, provision of water without allowing for the removal of wastewater may create standing water, thereby outweighing positive benefits. The need for holistic and integrated planning has been insufficiently recognised (Schertenleib, 2000).

Fig. 9
Urban farmers washing vegetables in a heavily contaminated canal in Kunming before bringing them to market. The lack of adequate environmental sanitation leads to contamination of freshwater resources and poses various health hazards. Photo: D. Forster, August 2002

There has also been a tendency to develop systems that respond to problems of environmental waste management as perceived by policy makers and professionals, rather than to the actual needs of households and communities (Schertenleib and Gujer, 1999). Decisions on interventions – especially those requiring sophisticated technology such as sewerage – are commonly taken at a political or administrative level far removed from the people to be served. This frequently results in the refusal of the supposed users of services to accept operational responsibility, thereby jeopardising service sustainability. In order to promote user ownership of services, decisions should be taken at a level as close as possible to the source of the problem, in consultation with the people most directly affected.

Therefore, on grounds both of human need and better environmental management, it is important for the environmental sanitation community to radically re-direct its thinking. Any vision of environmental sanitation for the 21st century needs to identify efficient, sustainable and cost-effective methods that have the capacity to balance improvements in the quality of people's lives with the well-being of the environment (EAWAG/SANDEC and WSSCC, 1999; Schertenleib, 2000).

### 9.3.3 Status and dynamics of selected core problems in the highland and highland-lowland contexts

Highland-lowland interactions are especially crucial in many parts of the GMS, as they concern the same river system, namely the Mekong River basin.

Overexploitation of natural resources – primarily in the form of deforestation, especially in the upper zones of watersheds – is one of the main issues in both the highland and highland-lowland contexts. In the Lower Mekong Basin, which covers large portions of the GMS, the forest cover declined from 50 % to roughly 25 – 32 % (depending on the sources) from the 1970s to the mid-1990s (Hiroshi, 2000). Besides this reduction in the area covered by forests, the quality (in terms of biomass density) of remaining forest has also been decreasing steadily (MRC and UNEP, 1997). Together with a significant increase in hydropower and reservoir structures, and the augmented water demand resulting from intensified irrigation agriculture, greater impacts on flow regime, siltation rate, and extent and duration of floods can be expected in future.

The example of annual floods in the Mekong River systems highlights the vulnerability of the lowlands with regard to changes in the highlands, and thus stresses the importance of proper management of the complex highland-lowland system in a transboundary context. In the Mekong Delta and the Cambodian floodplains, floods periodically cause damage to infrastructure and crops on over 2 million hectares of land. The silt deposited is crucial for the ability of farmers to produce the rice that feeds much of the downstream areas. Floods also play a crucial role in maintaining agriculture productivity and livelihood security by flushing out saline water that intrudes up through the Mekong Delta. Inland fisheries, which provide almost 80 % of the protein consumed in Cambodia, are similarly vulnerable to fluctuations in the annual flood regime and to changes in sedimentation loads (Badenoch, 2002).

Mountain areas in the Greater Mekong Subregion are under increasing land use pressure. The intensity of commercial logging and shifting cultivation has increased in recent years, due to inappropriate land use policies, migration and resettlement, and a growing population that is faced with the challenge of deriving its livelihood from a limited and increasingly undermined resource base.

## 9.4 Synopsis and syndromes

### 9.4.1 Synopsis and syndromes in the urban and peri-urban context

Besides general political and institutional problems such as poor governance, weak leadership, inadequate municipal management capacity, and lack of coordination between stakeholders and sectors, most of the heavily weighted problems in urban and peri-urban areas are related to (a) poor sanitation (lack of safe drinking water, inappropriate disposal of municipal liquid and solid wastes, flooding due to lack of storm water drainage), resulting in deteriorating quality of surface and groundwater; and (b) urban migration and uncontrolled growth at the urban periphery. Many of these problems are closely interrelated and appear in different combinations.

### 9.4.2 Synopsis and syndromes in the highland and highland-lowland contexts

Analyses of core problems in the Greater Mekong Subregion (GMS) clearly indicate the relevance of a highland syndrome context as well as a highland-lowland syndrome context. The former is characterised by increasing pressure on natural resources in watersheds, problems of livelihood security among large parts of the highland population and limited policies to cope with these problems. The latter is characterised by the heavy dependency of the lowlands on the use of the highlands, especially in relation to the complex potentials and problems of floods and of living with them.

Assessment of the core problems of non-sustainable development in the GMS has, however, also shown that the two syndrome contexts – highlands and highland-lowland interactions – must be further differentiated along national boundaries. The countries of the GMS share a number of attributes, but still represent great diversity in terms of aspiration, stages of development, resource endowment, political economy and bilateral relationships with their neighbours. This is also reflected in how core problems are perceived by representatives of the different nations (Table 3), leading to differentiations among the selected syndrome contexts.

## 9.5 Research status and focus

After identifying and weighting core problems, the second major task of the Hanoi workshop was to formulate possible research themes. In principle, these themes were to constitute a response to the problems identified, aiming at resolution or mitigation.

Priority was given to two criteria – "importance" and "urgency" – which were combined into one scale as follows:

Table 4

Priority criteria used in last column of Tables 5 + 6.

| | Urgent | Less urgent |
|---|---|---|
| Very important | 1 | 2 |
| Important | 3 | 4 |
| Less important | 5 | 6 |

### 9.5.1 Proposed research themes

The proposed research themes in the two syndrome contexts, their realm and their assigned priority are shown in Tables 5 and 6, respectively (see Tables 2 and 3 for realm enumeration).

Table 5

Proposed research themes: urban and peri-urban context.

| Title | Realm | Priority |
|---|---|---|
| Integrated environmental management for sustainable development of urban areas in the Mekong Region | 4 | 1 |
| Environmental sanitation technologies for peri-urban communities in the Mekong Region | 4 | 1 |
| Transportation and traffic congestion: alternative solutions for cities in the Mekong Region | 4 | 2 |
| Study of the scientific basis for integrated management of the quality of running water | 5 | 2 |
| Capacity building for efficient urban management in the Mekong Region | 1 | 2 |
| Establishing the scientific basics of an environmental pollution control strategy for urban areas in Vietnam | 1 | 2 |
| Improved urban transportation systems – the case of Hanoi | 4 | 3 |
| Public environmental awareness – a tool for effective waste management | 2 | 3 |

(continued p. 286)

Table 5

(continued)

| Title | Realm | Priority |
|---|---|---|
| Enhancing environmental management capacities in urban areas in the Mekong Region | 1 | 3 |
| Information flows and decision-making processes in urban management – their impact on the sustainability of infrastructure systems | 1 | 3 |
| Strengthening the participation of urban actors in urban planning – the case of Ho Chi Minh City (HCMC) | 1 | 3 |
| Study of appropriate measures for supplying safe drinking water for people in flooded areas of the Mekong Delta | 4 | 3 |
| Urban farmers: strengthening urban agriculture to enhance urban, regional and national food security and livelihood | 3 | 4 |
| Selection of appropriate technologies for municipal wastewater management in urban areas of the Mekong Region | 4 | 4 |
| Integration of environmental sanitation – liquid and solid waste management and urban agriculture | 4 | 4 |
| Appropriate options for sewerage and sanitation systems in urban areas of Vietnam: overview and research | 4 | 4 |
| Natural resource degradation, lack of infrastructure and social practices in slum areas: reducing environmental risks and proposing technical improvements according to the aspirations and economic capacities of the population | 4 | 4 |
| Dependency relations and movement of people, goods, and capital between intermediate cities and metropolitan centres in Mekong countries: reducing disparities and unequal dynamics, and promoting integrated urban policies | 3 | 4 |
| Improvement of living conditions for low-income people in urban areas of the Mekong Region | 4 | 4 |
| Conservation of historically and culturally valuable areas and buildings | 2 | 4 |
| Housing market dynamics, land tenure systems and slum area development: reducing speculation and exclusion of the urban poor | 4 | 4 |
| Establishing a systematic education and training programme for urban environmental management in the Mekong Region | 4 | 4 |
| Capacity building for city/town government: urban governance and management | 1 | 4 |
| Reducing the development gap between large and small cities and towns in the Mekong Region | 2 | 4 |
| Impact of economically driven development on young people's behaviour and educational patterns | 2 | 4 |
| Improvement of urban environmental sanitation to promote sustainable development through re-use and recycling of organic waste for urban agriculture | 5 | 4 |
| Upgrading housing conditions in inner-city areas – the case of HCMC | 3 | 4 |
| Agricultural re-use of organic waste in urban areas of the Mekong Region | 5 | 4 |
| Urban and rural linkages | 1 | 4 |
| Urbanisation in the Mekong Region under the pressure of globalisation | 2 | 4 |
| Reducing disparities between inner-city and the peri-urban areas in the Mekong Region | 2 | 4 |
| Selection of appropriate composting technology to produce fertiliser from organic waste in urban areas | 4 | 4 |
| Upgrading water supply systems in new areas of urban expansion | 4 | 4 |
| The effect of rapidly growing cities on urban environments and livelihood | 4 | 4 |

Table 6

Proposed research themes: highland and highland-lowland contexts.

| Title | Realm | Priority |
|---|---|---|
| Living with flooding | 5 | 1 |
| Poverty reduction for highland communities: income generation and living conditions | 2 | 1 |
| Laws and policies related to highland community issues | 1 | 1 |
| Potential of shifting cultivation: ways and means of modifying/ improving upland farming to support livelihoods | 3 | 1 |
| Mechanisms of compensation for the use of mountain resources by downstream areas | 3 | 2 |
| Linkage between resource allocation, taxation and pricing systems; resource status and utilisation in highland and lowland areas | 1 | 2 |
| Measures for mitigating deforestation | 5 | 2 |
| Gender issues in land use, non-timber forest product management, and community forestry among ethnic minorities (Muong) | 4 | 2 |
| Capacity building in highland communities | 3 | 2 |
| Improving highland livelihoods: strengthening the non-farm sector in mountain areas | 3 | 2 |
| The role of ethnic groups in the use and management of natural resources in highland areas | 2 | 2 |
| Strengthening local organisations in highland areas | 1 | 2 |
| Ensuring stakeholder participation in sustainable development in Mekong countries | 2 | 2 |
| Strengthening local administration and organisational capacity for managing natural resources and the environment through auto-didactic learning processes | 1 | 2 |
| Community capacity for implementing community-based forest fire management | 5 | 3 |
| Selecting solutions for environmental protection in handicraft villages in the Mekong Region | 4 | 3 |
| Government attitudes and policies towards ethnic minorities in the Mekong Region: highland-lowland interaction | 1 | 3 |
| Upland land use dynamics: indigenous knowledge, bio-physical and socio-economic constraints and potentials | 4 | 3 |
| People's participation in decision-making processes in small-scale integrated watershed management | 4 | 3 |
| Impacts of land allocation on land use and land tenure by ethnic minorities (Dao and Muong) | 1 | 3 |
| Resource accounting and GIS exercise at the community/sub-watershed level – an effective means for monitoring resource status and utilisation | 1 | 4 |
| Natural resource accounting at the level of river catchment/district – a framework for resource allocation and institutional analysis | 5 | 4 |
| Cost-benefit analysis of the natural conversion of communal degraded highland forests into sustainable domestic productive forests | 2 | 4 |
| Soil conservation in highland areas | 5 | 4 |

(continued p. 288)

Table 6 (continued)

| Title | Realm | Priority |
|---|---|---|
| Traditional regulatory systems for natural resource management among ethnic minorities (Tay, Nung, Ede and Muong) | 2 | 4 |
| Globalisation and local wisdom: interactive processes in the Mekong Region | 1 | 4 |
| Upland farming systems | 3 | 4 |

### 9.5.2 Discussion of compiled and prioritised research themes

A total of 61 themes were proposed. As shown in Table 7, they are fairly well distributed among the five "scientific realms". The most heavily represented realms are political/institutional and infrastructure/land use.

Table 7

Overview of the proposed research themes by scientific realm.

| Realm | Urban/ peri-urban | Highland – lowland | Total |
|---|---|---|---|
| 1. Political and institutional | 7 | 8 | 15 |
| 2. Socio-cultural and economic | 6 | 5 | 11 |
| 3. Population and livelihood | 3 | 5 | 8 |
| 4. Infrastructure and land use | 15 | 4 | 19 |
| 5. Bio-physical and ecological | 3 | 5 | 8 |
| Total | 34 | 27 | 61 |

The number of themes assigned to each priority rating in the two context groups is shown in Table 8. It is noteworthy that the peri-urban/urban group was very sparing with prioritisation, giving first priority to only two proposals and assigning most themes a priority of 4. By contrast, the highland/lowland group gave twice as many themes a first priority rating, with the largest number of themes receiving a rating of 2.

Table 8

Overview of the proposed research themes by priority rating.

| Context | Priority rating | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| Urban/peri-urban | 2 | 4 | 6 | 22 | – | – | 34 |
| Highland/lowland | 4 | 10 | 6 | 7 | – | – | 27 |
| Total | 6 | 14 | 12 | 29 | – | – | 61 |

This difference may be partly explained by procedural differences. The "B" group first rated the themes according to "importance" and then rated their "urgency" in a second round. The "A" group attempted to assign ratings of 1–6 in one go. This may have discouraged the rating of 2, for example, because participants who did not want to designate a theme as "less urgent" (e.g. 2), were inclined to give it a rating of 3 ("important and urgent") instead. This does not explain the surprisingly high number of 4 ("important but not urgent") ratings assigned by the urban group, however. At any rate, it was found to be difficult to use two criteria combined into one scale.

Participants found that the time available to assess the themes was much too short. Furthermore, it was difficult to assess themes on the basis of title alone, without considering content and approach. Some participants felt that it would have been useful to explicitly consider the extent to which proposals corresponded to the core problems identified.

Participants also noted that the proposals did not yet address the specific patterns of related problems that form a syndrome. The response to this was that brainstorming on themes was only a preliminary step; it is not yet a test of the syndrome hypothesis.

### 9.5.3 Research to be pursued by the NCCR North-South in the JACS South East Asia

Based on the outcome of the Hanoi workshop, the specific knowledge and expertise of the partners involved and the limited resources available, research actively pursued in the JACS South East Asia will focus on (a) how to mitigate problems related to poor environmental sanitation in urban and peri-urban areas, and (b) developing mitigation strategies in conflicts between slash-and-burn farmers in the hills and rice farmers in the valleys. Research related to (a) will consider new strategies for the planning and implementation of environmental sanitation services, based on an integrated approach and the Bellagio Principles for sustainable environmental sanitation (Schertenleib et al., 2003). Research related to (b) will consider the spatial distribution of forms and levels of poverty in the uplands, systems of land conservation and the political decision-making process for conservation of forests.

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